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# Forest Insect and Disease Conditions in the Intermountain States during 1975

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INTERMOUNTAIN REGION
OGDEN, UTAH

## COVER STORY

Western gall rust, *Endocronartium harknessii* (J.P. Moore) Y. Hiratsuka is a common parasite of lodgepole and ponderosa pine in central Idaho. In some areas it appears that all of the lodgepole seedlings are infected. Careful examination of these seedlings reveals occasional uninfected individuals. These uninfected seedlings survive the gall rust attack and then have the opportunity to become crop trees.

# STATUS OF FOREST INSECT AND DISEASE CONDITIONS AND PROGRAMS

in the Intermountain Region

1975

Forest Insect and Disease Control
State and Private Forestry
Region Four Forest Service
U.S. Department of Agriculture
324 25th Street
Ogden, Utah 84401

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## RESUMÉ OF CONDITIONS

### ENTOMOLOGY

The mountain pine beetle continues to be the most damaging forest insect in the Intermountain Region. Losses to this insect are decreasing Regionwide but locally, heavy losses in lodgepole pine are still occurring on the Targhee, Caribou, Bridger-Teton, Wasatch, Uinta, and Ashley National Forests. Significant losses to this beetle also occurred on the Boise, Payette and Sawtooth National Forests. Mountain pine beetle is also killing whitebark and limber pine at elevations above the lodgepole pine type on the Bridger-Teton and Targhee National Forests and in Grand Teton National Park.

There was an overall increase in mountain pine beetle-caused mortality in ponderosa pine. Decreases in attacks at Bryce Canyon National Park were more than offset by losses on the Dixie National Forest and on the south side of the Uinta Mountains.

Douglas-fir beetle activity declined slightly on the Targhee National Forest and increased on the Sawtooth, Salmon, Boise, and Payette National Forests.

Other bark beetle outbreaks on the increase involved the Jeffrey pine beetle infestation on the Toiyabe National Forest and a western pine beetle infestation on the Emmett Ranger District on the Boise National Forest. The western pine beetle infestation is being logged in an effort to reduce the beetle population and to prevent an *Ips* buildup. Engelmann spruce beetle activity continued to decline in the Huntington Canyon infestation on the Manti-LaSal National Forest.

Western spruce budworm was the major defoliator in 1975 and caused visible damage on more than 700,000 acres of Douglas-fir, grand fir, subalpine fir and Engelmann spruce. This was an increase of more that 200,000 acres from 1974. Damage will continue in 1976 in most of the areas defoliated in 1975. Affected National Forests were the Boise, Bridger-Teton, Caribou, Challis, Salmon, Payette, and Targhee. Tree damage in not considered to have reached a critical stage and control is not recommended. Although damage levels do not indicate control is warranted, a field experiment involving less than 2,000 acres is being planned in cooperation with the Pacific Southwest Forest and Range Experiment Station. The purpose will be to evaluate effectiveness of two promising insecticides in reducing budworm population levels. A number of other defoliating pests of local rather than regional significance are included in the body of the report.

### PATHOLOGY

Dwarf mistletoe remains the most serious forest disease problem of conifers in the Intermountain Region. A control project on Bald Mountain at Sun Valley, Idaho was conducted to reduce mistletoe in a severely infected, virtually pure Douglas-fir stand. The project also reduced the fire hazard and improved the appearance of the stand. The area will be replanted to lodgepole pine in the spring of 1976.

Two other control projects were conducted in the Region. One on Charter Mountain, Emmett Ranger District, Boise National Forest, and the other on the Teasdale Ranger District, Dixie National Forest. In both cases, the infected overstory was sold or killed and sanitation-thinning was carried out in the understory.

An aerial survey was conducted to determine if dwarf mistletoe infection in lodgepole pine could be evaluated from a helicopter. Regeneration and overstory can be easily examined for mistletoe infection.

Examination of vegetation in the vicinity of the Navajo and Huntington Canyon Generating Stations for effects of sulfur dioxide ($SO_2$) continued. No damage attributed to sulfur dioxide was found.

*Fomes annosus* root rot infection centers were found on the Payette and Boise National Forests in Idaho. One center was found on Nevada State land on the east side of Lake Tahoe.

An area of white fir infected by the fungus *Cytospora* was found on the Escalante Ranger District, Dixie National Forest. Considerable mortality to young growth had occurred.

### ENTOMOLOGY

**Mountain pine beetle, *Dendroctonus ponderosae* Hopkins**

**Lodgepole pine**

During the past twenty years the mountain pine beetle has killed more than 100 million lodgepole pine in the Intermountain Region. Although the mountain pine beetle has always been an intergral component of the lodgepole pine ecosystem, and historical observations and records have reported past outbreaks—possibly three since 1890—the current epidemic may be the most extensive and damaging. Beginning on the Wasatch National Forest, Utah, in 1953, existing infestations spread and others developed independently until most of the lodgepole pine forests in the Intermountain States were affected. Peak tree killing was reached around 1967 and 1968. With a few notable exceptions the Regionwide outbreak is now on the decline. National Forests and Parks incurring the heaviest losses are the Targhee and Caribou National Forests, Idaho; Bridger-Teton National Forest and Grand Teton National Park, Wyoming; and the Wasatch, Ashley and Uinta National Forests, Utah.

On the Targhee National Forest, the once serious outbreak in the southern portion and along the western slope of the Teton Mountains has completely subsided. However, heavy tree losses are still in progress to the north in portions of the Island Park Ranger District. Tree attack ratios (ratios of 1975 attacks to 1974) of 4.8:1, 2.3:1, 1.6:1, and 1:1 were recorded in the area immediately east of Sawtell Peak. In the area surrounding Island Park Ranger Station, cruise data showed a three-fold increase in the number of 1975 attacks and an attack level of 20 trees per acre. Mountain pine beetle populations continued to encroach upon the Moose Creek Plateau in spite of heavy timber harvest activities. To the east, in the high-elevation stands of Yellowstone National Park, Wyoming, tree killing has decreased.

Immediately east of the Targhee National Forest, in western Wyoming, heavy beetle populations persist in some areas, but overall tree killing is at a low level. The heaviest concentration of "red tops" occurs in the corridor between Grand Teton and Yellowstone National Parks, while to the southeast, in the Teton Wilderness, widely scattered tree killing persists in the lower elevations. Elsewhere on the Bridger-Teton National Forest, the only infestation with potential is in the Gros Ventre drainage. Although declining at low elevations, beetle populations are slowly establishing themselves in the upper reaches of the drainage with notable infestation centers occurring in the South Fork of Fish Creek. Overall mortality in this area will not be as severe as that which occurred in the lower elevations.

Residual populations of light intensity persist in portions of the Greys River and along the west slope of the Wind River Range, with heaviest activity in the southern portion of the range.

Next to the Targhee outbreak, the greatest mountain pine beetle activity is on the Caribou National Forest in southern Idaho. In contrast to the relatively homogenous and contiguous lodgepole forest prevailing on the Targhee, the Caribou is characterized by sharp, broken topography containing a mosaic of lodgepole stands representing a wide spectrum of age and size classes. These variable stand conditions are not conducive to explosive, short-term outbreaks such as have occurred on the Targhee National Forest and elsewhere. Instead, we can expect a long term continuation of a series of short-lived, sporadic, and repeated infestations. It is likely that the overall infestation level on the Caribou National Forest, particularly in the southern half, will remain active for the next 5 to 10 years.

In northern Utah, the beetle continues to deplete lodgepole stands in portions of the Wasatch, Ashley, and Uinta National Forests. On the Wasatch National Forest, heavy tree killing is underway in the upper reaches of the Provo, Weber, and Bear River drainages and on BLM administered land near Meeks Cabin Reservoir. A lesser outbreak, but one with the potential to become damaging, is near Hoop lake in the extreme eastern portion of the Forest. On the adjoining Ashley National Forest, the infestation is widespread with reduced activity occurring in most of the established infestations. Gradually increasing tree mortality is forecast for many of the high-elevation lodgepole stands in both the Flaming Gorge and Vernal Ranger Districts. Widely separated tree killing of diminishing intensity continues in the West Fork of the Duchesne River on the Uinta National Forest.

Many active mountain pine beetle infestations exist on the Cassia Division, Sawtooth National Forest, Idaho. Losses were estimated to be over 120,000 trees in 1975. A large sale is proposed for the area if economically feasible. Timber crews measured a gross volume of 389 MMBF merchantable lodgepole pine sawtimber on 22,000 acres. Survey results showed

114 MMBF in standing dead trees and 275 MMBF in live trees. The sawtimber is scattered over hundreds of individual stands widely separated by grass-sagebrush and aspen type that occur at a relatively high elevation. This has produced a natural check on the rate of beetle increase. Annual losses appear to occur at a constant rather that an accelerated rate; however, exceptions occur within individual stands.

Industry has shown interest in logging 10 MMBF annually for the next 10 years. Even though the current beetle loss is about 21 MMBF per year, a sales program of this magnitude was shown to be entomologically feasible. Considerable beetle suppression could be attained by first logging stands which contain the largest diameter trees. A company has purchased a 55-acre site near Holister, Idaho for the purpose of building a mill. Much of the old-growth lodgepole pine is heavily infected with dwarf mistletoe and spike tops are numerous. The proposed sale would remove at least half of the old growth and encourage natural regeneration.

On the northern division of the Sawtooth National Forest mountain pine beetle populations remained epidemic and increased along the Warm Springs Creek and Big Wood River drainages west and north of Ketchum. An estimated 13,000 trees were killed in these areas in 1975. Mountain pine beetle infestations continued to cause heavy tree mortality in both lodgepole and ponderosa pine stands from McCall to Round Valley on the Payette and Boise National Forests, Idaho. The 1975 mortality was estimated at 22,000 trees. Infestations began about 1960 and expanded as areas became depleted. Over half of the infestations are on private lands and little has been done by the landowners to reduce continuing tree losses. Increased mountain pine beetle activity was noted during the aerial survey in and around the town of McCall where more than 12,000 trees were killed in 1975.

Infestations in lodgepole pine occurred along most of the Clear Creek drainage, Cascade Ranger District, Boise National Forest, and in the Cuddy Mountains, Council Ranger Distrct, Payette National Forest. About 19,000 trees were killed in scattered groups in both areas. Aggressive infestations of mountain pine beetle in lodgepole pine were detected: (1) along a six-mile strip of the upper South Fork of the Boise River, (2) along the West Fork of Big Smoky Creek on the Sawtooth National Forest, (3) along Squaw Creek drainage on upper Yankee Fork, (4) in the Little Boulder Creek drainage on the East Fork of the Salmon River, (5) along Warm Springs Creek, (6) Stanley Creek, (7) Upper Loon Creek drainage, and (8) near Sheepeater Hot Springs on the Challis National Forest, Idaho. Numerous scattered red top groups in lodgepole pine were noted from the Payette Lakes ski area to Brundage Mountain. An infestation numbering about 2,000 faders was mapped in the Paddy Flat area on the Payette National Forest. Aggressive infestations killed groups of lodgepole pine near Trinity Lakes and along Johnson Creek, west of the Sawtooth Primitive Area, Boise National Forest.

Generally there is still abundant host material around the infested areas to perpetuate the mountain pine beetle epidemic. In addition, younger trees are attaining a size which makes them susceptible to the beetle. These stands have been depleted by the beetle in the past. This condition prevails on large lodgepole pine acreages within the Sawtooth National Recreation Area presently free of infestation.

**Ponderosa pine**

Killing of ponderosa pine by the mountain pine beetle increased over that recorded in 1974, particularly in portions of the Dixie National Forest in southern Utah. The once serious outbreak in Bryce Canyon National Park, Utah, and the East Fork of the Sevier River, Dixie National Forest, continued to decline. However, significant increases, not only in the total number of tree attacks but in the size of tree groups have occurred near the Table Cliff Plateau, Escalante Ranger District. In contrast to this proliferation of group killing, attacks are widespread and limited to individual trees in the southern half of the Cedar City Ranger District. In the Ashley National Forest to the north, in and adjacent to Flaming Gorge National Recreation Area, the long-standing infestation in mixed ponderosa-lodgepole stands continued to decline. In Uinta Canyon, on the south slope of the Uinta Mountains, where control was undertaken in 1968, the infestation in small diameter ponderosa pine is on the upswing and will continue to increase in intensity. No control is planned.

**Whitebark and limber pine**

The cessation of a mountain pine beetle outbreak in

lodgepole pine is usually followed by an increase in killing of nearby whitebark and limber pine at higher elevations. This characteristic trend has been observed and recorded in portions of the Bridger-Teton and Targhee National Forests and Grand Teton National Park. In many areas in both Forests and Parks, significant mortality of these white pines is still occurring, although beetle activity in the intermixed and adjacent lower elevation lodgepole pine stands has practically ended.

An area of limber pine was killed by mountain pine beetle near Brundage Mountain, Payette National Forest.

**Jeffrey pine beetle,** *Dendroctonus jeffreyi* **Hopkins**

While at a low level for several years, Jeffrey pine beetle populations on the Toiyabe National Forest, Nevada and California, increased significantly in 1974 and 1975. Widely separated tree killing is occurring throughout the pine type from Lake Tahoe south to Bridgeport. Jeffrey pine is the principal host with fewer attacks on ponderosa and lodgepole pine. Some of these host trees may also be infested with the mountain pine beetle, *Dendroctonus ponderosae* Hopkins. Although the overall infestation is confined to individual trees, some group killing of Jeffrey pine is occurring southeast of Markleville, California.

**Western pine beetle,** *Dendroctonus brevicomis* **LeConte**

On the Emmett Ranger District, Boise National Forest, a western pine beetle outbreak covering over 4 square miles of overstocked ponderosa pine took a dramatic upturn in 1975. A large commercial thinning sale is in progress to log infested trees before beetle flight. A coordinated salvage sale is proposed for logging infestations outside the sale boundary. Slash disposal techniques include tree-length skidding and concentration of slash piles at landings for burning prior to June 30 to prevent *Ips* buildup.

**Douglas-fir beetle,** *Dendroctonus pseudotsugae* **Hopkins**

A serious outbreak of the Douglas-fir beetle continued to cause heavy mortality in several areas on the Targhee National Forest. Following the initial buildup in storm-damaged timber in 1970, this infestation increased each year through 1974. Although the infestation had reached its peak and experienced a slight decline in 1975, many stands remain that are highly susceptible to attack. Unlike outbreaks of the mountain pine beetle, the Douglas-fir beetle can only maintain itself for 3 or 4 years in standing green trees and will not deplete its host trees to the degree the mountain pine beetle does in lodgepole pine. Heavy mortality will continue in some areas, but overall losses will be below those experienced during the past several years. Mortality will linger in areas such as Rattlesnake Creek, Howard Creek, Keg Creek, Hotel Creek, Big Bend Ridge, and Snake River Butte.

Douglas-fir beetle infestations have increased over most of the Sawtooth, Boise, and Salmon National Forests since 1974. High incidence of tree mortality also occurred in the Idaho Primitive Area on the Payette National Forest; elsewhere tree mortality was low. The Challis National Forest showed the lowest incidence although thirty small groups of faders were detected which represented a 50 percent increase over 1974.

On the Boise National Forest the number of aerial sketch-mapped groups of Douglas-fir faders increased about 45 percent over 1974. There were 540 fader groups scattered over the Forest. Largest groups contained more that 80 red-topped trees. Douglas-fir fader groups were widely scattered over hundreds of square miles within the Boise River drainage from Cottonwood Creek east to Queens River and throughout the entire Mores Creek Drainage from Boise Peak to Mores Creek Summit. Most of the mortality of prime timber occurred along the upper South Fork of the Payette River, Lowman Ranger District, and the Deadwood River drainage. Several active helicopter salvage sales are in progress in these areas. Considerable groups of faders were scattered throughout much of the remainder of the Lowman, Emmett, and Cascade Ranger Districts.

Douglas-fir beetle damage increased slightly on the Salmon National Forest, Idaho, killing merchantable timber in some 307 infestation centers. The largest centers contained over 200 faders. Most Douglas-fir beetle activity was concentrated on the western division of the Forest, which incluced the Panther Creek drainage, and much of Little and Big Deer Creeks, and the Beaver and Clear Creek drainages. Other infestation centers were scattered throughout Owl

Creek, Indian Creek, and the North Fork of Salmon River drainages of the North Fork Ranger District. Infestation centers were also concentrated at the north end of the Salmon River Mountains between Moose and Comet Creeks. The remaining infestations were widely scattered over the Forest with over half of the damage in inaccessible areas.

Douglas-fir fader groups observed on the northern division of the Sawtooth National Forest increased almost three-fold since 1974. The major buildup was in groups of 3 to 10 trees. There were 182 such groups. In addition, there were 68 groups with greater than 10 trees each. The largest groups contained more than 150 trees. Greatest losses of timber occurred on the east side of the Forest within the South Fork of the Boise River drainage between Featherville and Carrietown.

On the Payette National Forest more than 200 Douglas-fir fader groups were sketch mapped, an increase over 1974 losses. The largest groups numbered 80 or more trees. Heavy concentrations occurred in the Idaho Primitive area within the Whimstick, McCalla, Disappointment, and Tag Creek drainages. Losses occurred on the southern half of the Council District, on Grade, Brownlee, and Pine Creeks. Widely scattered groups of dead Douglas-fir were found on the Weiser District. However, no large-scale losses were observed.

**Engelmann spruce beetle,** *Dendroctonus rufipennis* **(Kirby)**

The Engelmann spruce beetle infestation on the Manti-LaSal National Forest, Utah, continued to decline in 1975 following its peak in 1973. During 1975 widely scattered mortality occurred in upper Huntington Canyon with heaviest damage in Lake, Boulger, and Swens Canyons. This infestation was first detected in 1970, and by 1974 between 26 and 82 percent of the merchantable volume had been killed. Poor timber markets and inadequate local mill capacity are the most important elements for not salvaging this material to date. A more intensive effort must be made to utilize this material before it becomes unmerchantable.

An Engelmann spruce beetle trap-tree program was conducted in conjunction with a salvage sale in the leave strips of the old Deer Valley timber sale area on the Dixie National Forest. As a result of the data collected during this program, several recommendations which should decrease the potential for spruce beetle buildups following timber cutting have been determined, they are:

1. The area-to-boundary ratio of the clearcuts should be as large as possible. This can be accomplished by using large circular blocks instead of long rectangular ones. This technique will minimize the amount of exposed boundary subject to blowdown.

2. Establish followup procedures during sale preparation for removing blowdown around the boundary for 2 or 3 years following the clearcutting. Removing blowdown will not only provide additional volume but will also remove host material which will produce large numbers of beetles. A similar technique should be used when cutting new roads through spruce stands.

3. Trap-trees can be used to reduce the potential for beetle attack on standing green trees.

**Fir engraver beetle,** *Scolytus ventralis* **LeConte**

Fir engraver beetle continued to kill large subalpine fir on summer home sites around Cascade Reservoir on the Boise and Payette National Forests. Widely scattered single- and multiple-tree groups were killed after completion of a timber sale on the New Meadows District, Payette National Forest.

**Western spruce budworm,** *Choristoneura occidentalis* **Freeman**

The western spruce budworm continued to be the most important forest defoliator in the Intermountain Region. Persistent and variable budworm populations continued to defoliate Douglas-fir, grand fir, subalpine fir, and to a lesser degree, Engelmann spruce throughout seven National Forests in southern Idaho and western Wyoming (Table 1).

Of the current infestations, the outbreak on the Payette National Forest has the longest history, dating back to the year of the first available record — 1922. The most recent, continuous outbreak is the one on the Bridger-Teton National Forest which

became visible in 1965. This infestation has continued unabated since then. These two separate infestations as well as the one on the Salmon National Forest all increased in size over that recorded in 1974. The Bridger-Teton infestation, for example, exhibited more that a six-fold increase in defoliated area while the Payette and Salmon infestations increased two and three times, respectively (Table 2).

Although tree damage is rather extensive, particularly in the older, sustained infestations, it has not reached a critical stage. In a few areas tree mortality has occurred, particularly in the suppressed understory, but the most widespread and significant effect is top-kill and growth reduction. In many of the older infestations, where budworm populations have declined, there has been a marked increase in radial growth.

Although perhaps not biologically significant, the development of budworm populations was unusually slow during 1975. Because of prolonged cold and moist weather during May and June, larvae emerged late from hibernacula and the larval development period was extended. In previous years, by the last week of August, adult activity had ceased and egg hatch was complete. By late August of 1975, moths were abundant and oviposition was still in progress. In areas where this phenomenon was observed, especially on the Targhee National Forest, egg deposition was exceptionally heavy even though egg mass surveys were premature.

An analysis of egg mass data indicates static to slightly increasing activity on the Payette, Boise, and Salmon National Forests. The heaviest damage predicted for 1976 will occur in the following areas: No Business Mountain, Fawn Creek, Willow Creek, Rapid Creek, Paddy Creek, and Brundage Mountain on the Payette National Forest; West Mountain on the Boise National Forest; and Porphyry Creek on the Salmon National Forest. Top-kill of mature trees and mortality of understory are evident in many areas.

Significant increases in both intensity and extent of defoliation are to be expected on the Targhee and Bridger-Teton National Forests. Particularly heavy egg mass deposition occurred in Pleasant Valley and the Raynolds Pass area on the Targhee National Forest; in Cache and Porcupine Creeks, and in Bull Hollow and Leeks Canyon on the Bridger-Teton National Forest. Heavy defoliation will be highly visible in the Grand Canyon of the Snake River and on Snow King Mountain, the scenic backdrop to Jackson, Wyoming.

Table 1. Area of visible western spruce budworm defoliation in the Intermountain Region during 1975 as determined by aerial surveys.

| | DEFOLIATION INTENSITY (ACRES) | | | |
|---|---|---|---|---|
| FOREST | LIGHT | MEDIUM | HEAVY | TOTAL |
| Boise | 128,000 | 2,500 | 2,000 | 132,500 |
| Bridger-Teton | 58,000 | 56,600 | 4,600 | 119,200 |
| Caribou | 300 | | | 300 |
| Challis | 10,600 | | | 10,600 |
| Salmon | 19,900 | | | 19,900 |
| Payette | 323,300 | 63,600 | 27,100 | 414,000 |
| Targhee | 28,700 | 8,200 | | 36,900 |
| | 568,800 | 130,900 | 33,700 | 733,400 |

Table 2. Area of visible defoliation by the western spruce budworm in the Intermountain Region during the past 12 years as determined by aerial surveys.

| | DEFOLIATION INTENSITY (ACRES) | | | |
|---|---|---|---|---|
| YEAR | LIGHT | MEDIUM | HEAVY | TOTAL |
| 1964 | 266,000 | 658,000 | 1,352,000 | 2,276,000 |
| 1965 | 465,600 | 254,500 | 795,200 | 1,515,300 |
| 1966 | 923,900 | 52,200 | 16,100 | 992,200 |
| 1967 | 162,200 | 54,900 | 1,600 | 218,700 |
| 1968 | 333,500 | 150,200 | 21,800 | 505,500 |
| 1969 | 388,800 | 125,400 | 30,200 | 544,400 |
| 1970 | 223,200 | 79,300 | 5,200 | 307,700 |
| 1971 | 229,300 | 110,300 | 34,300 | 373,900 |
| 1972 | 395,300 | 100,700 | 9,500 | 505,500 |
| 1973 | 99,700 | 76,400 | 48,000 | 224,100 |
| 1974 | 234,900 | 111,300 | 11,600 | 357,800 |
| 1975 | 568,800 | 130,900 | 33,700 | 733,400 |

**A Sawfly,** *Neodiprion fulviceps* **Cresson**

Since 1970 this sawfly has caused heavy and sustained defoliation to a small, isolated stand of ponderosa pine on the Fishlake National Forest, Utah (Figure 1).

**Figure 1.** Newly emerged sawfly larva, *Neodiprion fulviceps* Cresson, Fishlake National Forest, Utah.

Atypical of many sawfly populations which reach peak levels in a short time, then decrease suddenly, this insect has maintained relatively high numbers during the past six years. Even though repeated defoliation is strikingly visible, tree mortality has yet to occur. Efforts will be made to record the impact of this sawfly on individual trees.

**Tent caterpillar,** *Malacosoma incurvum discoloratum* **(Neumoegen)**

The tent caterpillar population on Fremont Cottonwood in Capital Reef National Park decreased in 1975 as predicted from egg mass data collected in 1974. Only a few scattered tents were found on cottonwood trees near the Visitor's Center and one tent was reported on a domestic apricot tree. All tents were small with defoliation limited to the immediate area around the tent. Elsewhere in the Park, tents and/or defoliation were not apparent. Tent caterpillar activity should be of little consequence in the Park during 1976.

**Douglas-fir tussock moth,** *Orgyia pseudotsugata* **(McDunnough)**

No visible defoliation by Douglas-fir tussock moth

was detected during the annual aerial survey. Yard trees on a farm near Rupert, Idaho sustained top damage from a localized infestation that has persisted for several years. Almost all pheromone traps placed throughout southwestern Idaho caught male moths. Impact plots are being maintained on the Sawtooth National Forest and other federal, State of Idaho, and private lands to determine short- long-range effects of heavy defoliation that occurred in 1973.

**Pine butterfly,** *Neophasia menapia* **(Felder and Felder)**

Several reports were received of conspicuous flights of pine butterfly on the Boise and Idaho City Ranger Districts, Boise National Forest. No visible defoliation was detected during the annual aerial survey. Pine butterfly activity was at a low level throughout the rest of the Region.

**Fall cankerworm,** *Alsophila pometaria* **(Harris)**

An outbreak of the fall cankerworm was first reported in 1974 and continued to defoliate several hardwood species on the Fishlake National Forest during 1975. Heaviest defoliation occurred on boxelder and gambel oak with light to moderate defoliation on bigtooth maple and chokecherry. No permanent damage is expected since all trees refoliated following larval feeding.

Another infestation along the Wasatch Front between Ogden and Salt Lake City, Utah, defoliated the above tree species plus domestic apple. Defoliation has created a nuisance for howeowners in the bench areas, but no tree mortality has been reported.

**White fir needle miner,** *Epinotia meritana* **Heinrich**

The persistent infestations of this needle miner continues in small localized outbreaks in the upper reaches of the East Fork of the Sevier River, Dixie National Forest (Figure 2). Although larval populations are not as numerous as in past years, they are present in sufficient numbers to cause visible defoliation. In some instances the trees have become so weakened that they have succumbed to attacks by the fir engraver, *Scolytus ventralis* LeC. In other areas, many of the heavily damaged trees appear to be recovering. Further study is planned to determine the impact of this long standing outbreak on individual trees and the stand.

**Figure 2.** **White fir stand defoliated by the white fir needle miner,** *Epinotia meritana* **Heinrich, Dixie National Forests, Utah.**

**A leafroller, *Archips negundanus* (Dyar)**

A persistent infestation of this leafroller has caused heavy defoliation of boxelder throughout most of the rural areas of northern Utah for eight years. The trees refoliate by mid-summer and appear outwardly to have suffered no apparent damage. They will be re-examined in 1976 to determine if there has been any impact from this unusally long outbreak.

**Brown day moth, *Pseudohazis eglanterina* (Boisduval)**

This voracious defoliator of range plants was active in several localized areas in eastern Nevada. Snowberry was the desired host, with less preference shown for serviceberry, bitterbush, chokecherry, elderberry, gooseberry and wild rose. Nearby pinyon pine, juniper, sagebrush, and mountain mahogany were not affected. Heaviest activity was observed near California Springs whith lighter infestations near Indian, Tom Plain, and Lion Springs. In the latter infestation, larvae were found to be affected by a polyhedrosis virus. Since this insect has a two-year life cycle, larval populations will not re-occur until 1977, at which time natural factors are expected to exert considerable control (Figure 3). In past infestations, this insect has caused negligible permanent damage.

**A defoliator complex**

A complex of lodgepole pine defoliators caused light to moderate defoliation in lodgepole pine stands on the Targhee National Forest and Bridger-Teton National Forest. The lodgepole pine terminals were damaged by the sugar pine tortrix, *Choristoneura lambertiana* (Busck), pine sheath needle miner, *Zelleria haimbachi* (Busck), and *Archips argyrospilus* (Wlk.) (possible new host). Only specimens from the Bridger-Teton infestation were available for identification. In the Targhee infestation, defoliation occurred in all size and age classes on approximately 15,000 acres near Warm River Butte. On the Bridger-Teton, 5,000 acres were damaged along the south side of the Snake River just above Palisades Reservoir. Both infestations were first detected on-the-ground in 1975. Neither were observed from the air. The trend of these infestations is unknown.

Sugar pine tortrix damage to laterals and leaders of young lodgepole pine in a thinned stand was observed on private lands near Donnelly, Idaho. Evaluation is continuing.

Figure 3. Larva of the brown day moth, *Pseudohazis eglanterina* Bdv. parasitized by a braconid wasp, Humboldt National Forest, Nevada.

**Defoliator-species unknown**

Approximately twenty-five acres of Douglas-fir on BLM lands south of Salmon, Idaho were moderately to heavily defoliated. From the air, defoliation appeared to be identical to that caused by tussock moth. Ground evaluations, however, showed damage being caused by an as yet unidentified lepidopteran. The area will be re-examined in 1976. It is hoped that larvae, pupae, or adults will be recovered from which a positive identification can be made.

**Gypsy moth,** *Porthetria dispar* **(L.)**

Concerned by the possible introduction of the gypsy moth into the western United States, APHIS initiated a program for prompt discovery of this insect several years ago. During 1975, in cooperation with the National Park Service and APHIS, Region 4 maintained several pheromone baited traps located in Capital Reef and Zion National Parks in southern Utah. These areas were selected due to their proximity to major east-west travel routes and the availability of suitable host trees. No gypsy moths were discovered in 1975.

**Black pine-leaf scale,** *Nuculaspis californica* **(Coleman)**

This scale has reached damaging proportions in a 120-acre stand of Jeffrey pine in the historic town of Genoa, Nevada. The scale has caused deep concern to individual property owners whose trees are infested and threatened. Although the cause of this sudden outbreak is not fully understood, it is suspected that the heavy scale populations were triggered by repeated aerial application of malathion for adult mosquito control during 1969 and 1970 and possibly intensified later by sporadic, inadequately timed attempts at individual tree control. These applications may have reduced the numbers and effectiveness of the parasite complex thereby causing the rapid increase in scale population.

The overwintering scale population is exceptionally heavy. In November of 1975, an average count of 33 scales per centimeter of needle length was recorded over the entire infestation. Many trees are under serious stress, but control was not advised because of difficulties in treatment timing and the danger of phytotoxicity. The infestation will be closely monitored in 1976.

**Oystershell scale,** *Lepidosaphes ulmi* **(L.)**

Localized and separate outbreaks of this scale were reported on willow, aspen, and bitterbush in portions of the Ruby Valley, western Nevada. On the Gardner Ranch, scale populations were heavy enough to kill willow. The overall infestation level is not considered serious nor a threat to nearby forest lands. Control was not recommended.

## PATHOLOGY

**Dwarf mistletoe,** *Arceuthobium* **spp.**

*Arceuthobium douglasii* **Engelm. Douglas-fir.**

A dwarf mistletoe control project financed by Title X of the Public Works and Economic Development Act was conducted on Bald Mountain on the Ketchum Ranger District, Sawtooth National Forest. Bald Mountain is the main ski hill in the Sun Valley complex. The objectives of this project were to convert a severely infected Douglas-fir stand to a healthy mixed species stand by killing all the infected trees and favoring non-host trees. In addition, Ranger District personnel desired to improve the aesthetics of the area by removing the decadent, spike topped and heavily broomed mislteoe infected trees, and favor young, healthy trees. Because of the extreme fire hazard created by the dwarf mistletoe debris, another objective was to reduce the fire hazard by felling snags and piling and burning all debris found on the forest floor. Wood from the snags and spike tops suitable for firewood was hauled to a nearby road and piled. This wood was given away via free use permits. By doing this, the amount of wood to be burned in place was considerably reduced. Almost every Douglas-fir on the project area was felled, bucked and burned or given away as firewood. Occassional subalpine fir, lodgepole pine, limber pine and hardwoods provided marginal stocking. A few Douglas-fir, whose dwarf mistletoe infections were pruned out were left. The area will be planted to lodgepole pine in the spring of 1976.

*Arceuthobium vaginatum* **subsp.** *crytopodum.* **(Engelm.) Hawksworth & Wiens. Southwestern Dwarf Mistletoe.**

A 145-acre dwarf mistletoe control project was conducted on the Teasdale Ranger District, Dixie Nation-

al Forest. Project plans called for the sale of approximately 50 MBF of overstory ponderosa pine trees and sanitation-thinning of the understory. The sanitation-thinning has been completed. Sale of the overstory is continuing. Due to a local *Ips* hazard all slash over 3" in diameter was lopped into 2' to 4' lengths. This is a continuing project. Approximately 2,000 acres will have been treated when the project is completed.

*Arceuthobium campylopodum*, **Engelm. Western dwarf mistletoe.**

A dwarf mistletoe control project on the Quartzburg-Charter Mountain Burn, Emmett Ranger District, Boise National Forest, was financed with I&DC funds. A total of 780 acres was treated by the project crews. Close to 6,750 dwarf mistletoe infected ponderosa pine were sold or felled and bucked in 2' to 4' lengths, or less, to reduce the chance of *Ips* beetle buildup.

This was part of an area that had burned twice in the past. To rehabilitate the burn, over 5,000 acres were contour terraced and planted. Scattered overstory trees that the fire had missed were left standing. Most of these trees were mistletoe infected. The accomplishment of overstory removal on one more unit will complete this project. Trees accessible to existing roads and trails were removed by timber sale.

**Detection and Evaluation of Dwarf Mistletoe Infection from the Air**

This study had two objectives:

1. To determine whether dwarf mistletoe infection could be located from the air.

2. To determine whether the three criteria used to decide if an area was suitable for a dwarf mistletoe control project could be evaluated from the air.

These three criteria are:

a. Good site.

b. Adequate advance regeneration in both size and numbers.

c. Whether the overstory contained commercial or non-commercial volumes.

From past experience it was known that such evaluations were impossible from fixed-wing aircraft due to their necessary high speed and elevation above the ground. Since a helicopter can fly both low and slow, it was felt that successful detection would be possible by use of such an aircraft. This was found to be correct. Dwarf mistletoe infected trees could be easily spotted from the helicopter at 40-50 mph at an elevation of 50' to 200' over the tree tops. In addition, criteria b, and c, could also be judged. A ground check of the aerial observations confirmed the validity of these observations. Use of this technique will assist in determining areas in which to conduct control projects.

**Air Pollution**

Plots established for the assessment of sulfur dioxide effect on vegetation in the vicinity of the Navajo Generating Station, Page, Arizona were re-examied in May of this year. Two of the units of the three-unit generating station are now "'on line". Emmissions of $SO_2$ are unrestricted but no damage to the vegetation ascribable to $SO_2$ was found. Closeup photographs were taken of foliage of most of the herbaceous and tree species in the Lake Powell Area. Vegetation in the stream bottoms, on hillsides and ridgetops around the Huntington Canyon Generating Station south of Price, Utah were re-examined and photographed in September 1975. No damage attributable to the effects of $SO_2$ could be found.

**Annosus Root Rot, *Fomes annosus* (Fr.) Cke.**

*Fomes annosus* infection centers were found at four different locations this year. Numbers of infection centers found at a location ranged from one to many. On the Calf Pen area of the Council Ranger District, Payette National Forest, approximately 15 *F. annosus* infection centers were found. Mortality was occurring in planted and natural ponderosa pine regeneration around stumps created by a timber sale conducted 10 years ago. Two infection centers were found in the Lost Creek ponderosa pine plantation, New Meadows Ranger District, Payette National Forest. Planted ponderosa pine approximately 5' to 6' tall were being killed around two stumps created 8 to 10 years ago.

A center was found on State of Nevada land east of Lake Tahoe near Marlette Lake on an old (age un-

known) timber sale area. Eleven true fir seedlings and saplings had been killed.

On an old timber sale on the Ola Slope Area of the Emmett Ranger District, Boise National Forest, *F. annosus* was found killing sawlog and pole-sized ponderosa pine.

*Cytospora* **canker on white fir,** *Abies concolor*

An unknown species of fungus of the genus *Cytospora* was found causing branch and top killing and some mortality of white fir in the Canaan Mountain Area of the Escalante Ranger District, Dixie National Forest. Approximately 2,500 acres are affected on Canaan Mountain and approximately 400 acres are affected at the Cabbage Flat Area 11 miles north of the Canaan Mountain infestation. *Cytospora* supposedly attacks trees weakened by fire, drought, dwarf mistletoe, and root rot. No predisposing factors have yet been determined in the affected areas.

# DISTRIBUTION OF MAJOR FOREST INSECT INFESTATIONS IN REGION 4*

1975

LEGEND

- *Mountain Pine Beetle*
- *Douglas-fir Beetle*
- *Engelmann Spruce Beetle*
- *Western Spruce Budworm*

*Based on aerial and ground surveys*

STATE AND PRIVATE FORESTRY

FOREST SERVICE

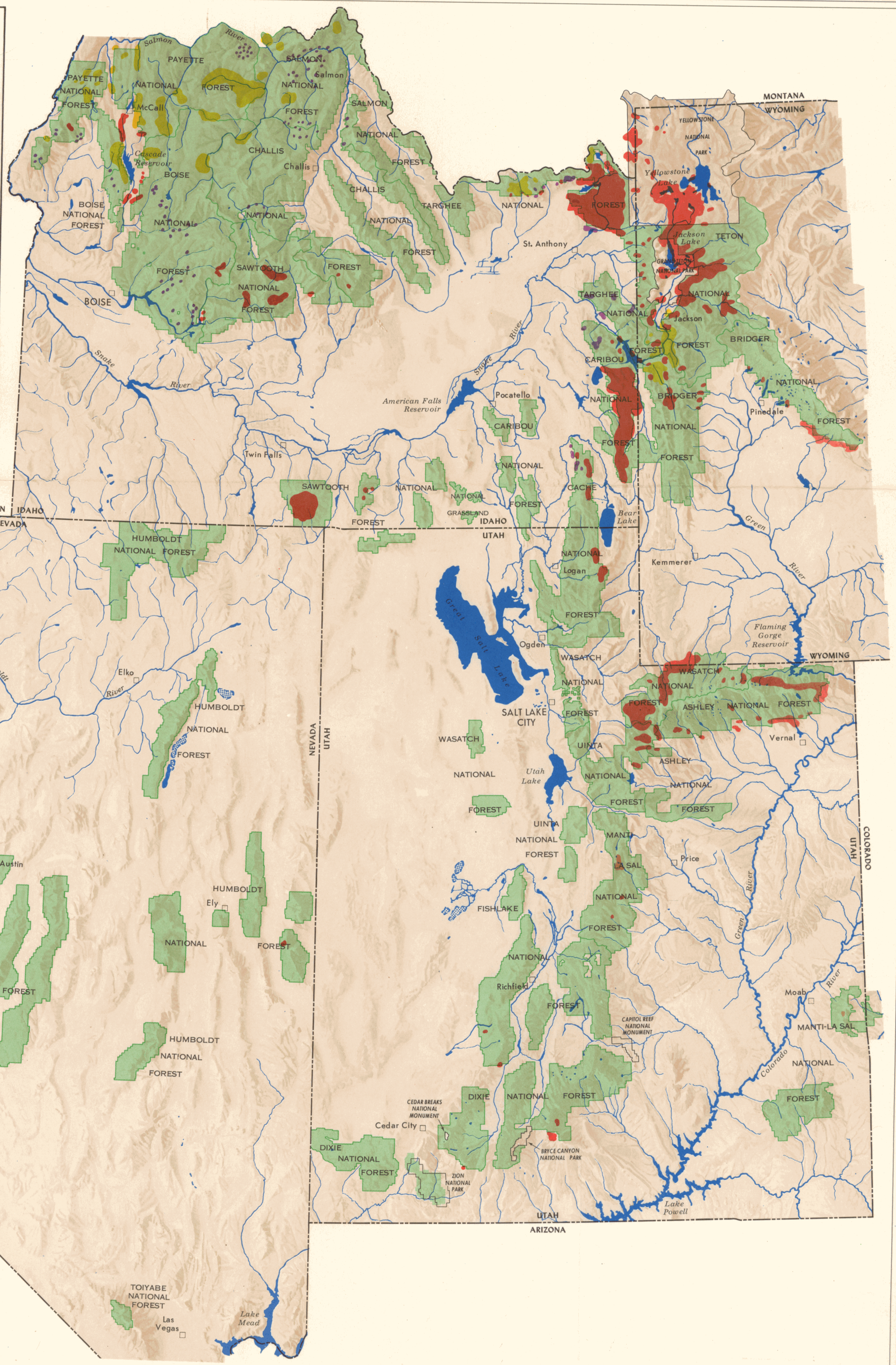
U.S. DEPARTMENT OF AGRICULTURE

SCALE

*miles*

0 40

*Recent reorganization has resulted in numerous boundary changes which are not shown on this map. In addition portions or several National Forests were not flown.




RELIEF MAP
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